



Secretary for  
Environmental  
Protection

# Air Resources Board

Alan C. Lloyd, Ph.D.  
Chairman

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Gray Davis  
Governor

September 20, 1999

Mr. Lawrence D. Odle  
Air Pollution Control Officer  
Butte County Air Quality Management District  
2525 Dominic Drive, Suite J  
Chico, California 95928

Dear Mr. Odle:

I am responding to your recent letters dated August 16, 1999, and August 25, 1999, to Mr. Bob Fletcher and Mr. Mike Tollstrup. In your letters, you requested written guidance on permitting stationary and portable diesel-fueled engines. I am pleased to respond to your letter.

As you know, we recently listed particulate emissions from diesel-fueled engines as a toxic air contaminant. At the same time, the Air Resources Board (Board) directed us to work with industry and environmental leaders during the risk management efforts. We have formed an Advisory Committee, and five subcommittees, to assist us in addressing risk management issues associated with diesel-fueled engines and vehicles. Information on these risk management activities can be found on our website ([www.arb.ca.gov/toxics/diesel/diesel.htm](http://www.arb.ca.gov/toxics/diesel/diesel.htm)).

We appreciate your request to expeditiously develop guidance materials for use by the districts in permitting stationary diesel engines. Over the last year, we have been actively pursuing the development of such guidance. The issues are extremely complex and we have taken a deliberate and thorough approach to ensure that all significant issues are identified and addressed.

We are now focusing our efforts on a technology-based approach that recognizes and accommodates the significant improvements made in diesel-engine emissions control technology, yet retains a risk-based review under certain special conditions. In August 1999, we released the *Draft Conceptual Outline for the Risk Management Guidance for the Permitting of New or Modified Sources That Operate Stationary Diesel-Fueled Engines*. Based on this outline, the new guidance document will be "diesel-specific," establishing technology-based standards based on engine horsepower and hours of operation, with consideration of risk in certain site-specific situations. Site-specific risk assessments will generally be needed only for high-usage engines or

special situations such as an engine located near a school site. We have enclosed a copy of this outline.

We expect to complete a draft of the guidance by the end of the year and complete the guidance in the Spring 2000. We will address the issues identified in your letter and encourage your staff to participate in the development of the guidance. As you mentioned in your letter, we are recommending that the districts exercise caution in the permitting of stationary engines pending the completion of the guidance. As you know, we have been providing assistance to your staff in the permitting of two standby engines at a facility in your District and are prepared to continue to provide assistance on a case-by-case basis pending the completion of the guidance.

One of the issues you identified is the appropriate source testing methodology for stationary diesel-fueled engines. We are currently evaluating the relationship between the emission rates obtained using a transient test cycle to testing under steady state operations. Another testing issue that we are working on concerns particle size. ARB Method 5, entitled *Determination of Particulate Matter Emissions from Stationary Sources*, is used to measure particulate matter from stationary sources including stationary diesel-fueled engines. This method does not differentiate between particle sizes greater than and less than 10 microns. The unit risk factor for diesel particulate matter is based on particle size of 10 microns and less. ARB Method 501, in conjunction with ARB Method 5, can be used to determine the ratio of particles greater than 10 microns to particles less than or equal to 10 microns. We are hopeful that we can do testing at the facility mentioned above to address these two issues. To facilitate the testing, we are preparing a test protocol that we expect to forward to your staff within the next two weeks.

With regard to portable diesel-fueled engines, including those registered with the Statewide Program, the Stationary Source Subcommittee is working to evaluate the need for further regulation of particulate emissions from this source. This evaluation includes determining the present and future emissions inventory, the availability and technological feasibility of an airborne toxic control measure (ATCM), the cost of the ATCM, the magnitude of risk, expected reduction in risk associated with the proposed ATCM, and potential adverse impacts that may result from implementing the ATCM. The Stationary Source Subcommittee and the Advisory Committee will review the "needs assessment" report containing the results of these evaluations before presenting the report to the Board next year. The process moves into the regulatory development phase if the Board approves the recommendations in the "needs assessment" report.

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We are still gathering information for the preparation of the "needs assessment" report. Therefore, it is premature to determine whether portable engines will need further regulation until the completion of the "needs assessment" report. If the outcome of the "needs assessment" report indicates that diesel-fueled portable engines need to be controlled further, and the Board concurs with this recommendation, we will start the regulatory process for revising the Statewide Portable Equipment Registration Program Regulation. We will address the concerns you raised at that time.

In the interim, the district has the authority to regulate the operation of a portable engine registered with the Statewide Program at a given location. Examples of this authority contained in the Health and Safety Code include the provisions for nuisance and potential releases within 1,000 feet of the boundary of a school. Based upon this authority, the district has the ability at a given location to either stop the operation or limit the operation of a State registered engine. The district can issue a permit to limit the operation of the engine at a specific location; however, the State registration would continue to be valid outside of the limited locations.

We are committed to provide useful and timely guidance to the districts and again encourage your participation in the development process. If you have further questions or would like to discuss this matter further, please call me at (916) 445-0650, or have your staff call Mr. Dan Donohoue at (916) 322-8277.

Sincerely,

A handwritten signature in black ink, appearing to read 'Peter D. Venturini', with a stylized flourish at the end.

Peter D. Venturini, Chief  
Stationary Source Division

Enclosure

cc: See next page.

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cc: Mr. Bob Fletcher, Chief  
Emissions Assessment Branch

Mr. Dan Donohoue, Manager  
Technical Analysis Section

Mr. Mike Tollstrup, Manager  
Project Support Section

Mr. Stewart Wilson, Executive Director  
California Air Pollution Control Officers Association  
3232 Western Drive  
Cameron Park, California 95682

Air Pollution Control Officers/Executive Officers

**Draft Conceptual Outline for the  
Risk Management Guidance for the Permitting of  
New and Modified Sources that Operate Stationary Diesel-Fueled Engines**

August 18, 1999

**I. Purpose**

- ◆ Guidance on achievable performance levels for particulate matter emissions from new and modified stationary diesel-fueled engines
- ◆ Guidance to districts in making risk management decisions associated with permitting new and modified stationary diesel-fueled engines

**II. Applicability**

- ◆ Stationary compression-ignition internal combustion engines fueled by either diesel fuel or jet fuel
- ◆ Portable engines, if not covered by ARB Portable Equipment Program or otherwise preempted by Federal regulations.
- ◆ Equipment exempt from Guidance
  - Diesel-fueled external combustion equipment (boilers, heaters, kilns, dryers)
  - Diesel-fueled turbines
  - We may identify some very low emitting equipment
- ◆ Clarify that Guidance does not apply to mobile sources

**III. Key Terms**

- ◆ Diesel Engine Fuel
  - Fuel meeting the specifications defined by ASTM D975-98 (diesel); MIL DTL 5642 (jet); and ASTM D1655 (jet)
- ◆ Diesel-Fueled Engine
  - IC compression-ignition engines fueled by diesel engine fuel
- ◆ Emergency Standby Engine
  - Used when electrical power line or natural gas service fails
  - Used for emergency pumping of water for either fire protection or flood relief
  - Cannot be used to supplement primary power when the load capacity or rating of the primary power source has been reached or exceeded
- ◆ Modification
  - Addition of any new or relocated diesel engine at an existing source
  - Physical change to the engine or associated equipment not covered by the original permit action and likely to increase emissions. (Do we need to be more specific?)
  - Change in the method of operation beyond operating scenarios identified in the permit and likely to increase emissions
  - Rebuilds? (Should rebuilds be treated as modifications?)
  - Exact replacements? (Should these be treated as new?)

- Exemptions (not modifications): routine maintenance and/or repair, an increase in the hours of operation up to the permitted level, a change in ownership of a source
- ◆ Rebuilt Engine --crankshaft and/or pistons have been removed, crankshaft, pistons, cylinders, or components thereof repaired and/or replaced, engine more than three (3) model years old.

#### **IV. Achievable Performance Levels**

##### **A. Overview**

- ◆ This section will categorize and identify the achievable performance level for new and modified stationary diesel-fueled engines.
- ◆ Engine categories--We plan to identify engine categories based on type of service, horsepower rating, operating hours, or some combination of these factors. The categories identified will be highly dependent on the achievable performance level, and any identified performance or operational constraints in achieving the achievable performance level (e.g., weight of add-on control system for portable application). Risk considerations will also play a part in identifying the engine categories, particularly for high usage engines.
- ◆ Achievable performance levels for new and modified stationary diesel-fueled engines--We plan to identify achievable performance levels for new and modified stationary diesel-fueled engines using engine design and add-on control equipment information. In determining achievable performance levels, we will use engine certification standards and certification levels that are currently being met, permit information, source testing information, information from ARB's Portable Equipment Program, and information from engine manufacturers. We will also use information from control equipment manufacturers, including in-field testing results, equipment operators surveys, and any other appropriate data sources.
- ◆ Based on our analysis of engine technologies and add-on control equipment, we may recommend separate achievable performance levels for new and modified engines.
- ◆ All achievable performance levels will be based on emission reduction levels that are currently being met by diesel-engines with add-on controls and using available fuels. In the future, as technological advances are made that result in greater emission reductions or more cost effective emission control, the achievable performance levels should be reevaluated.
- ◆ Table 1 below is an example of how we currently plan to present the control requirement information.

Table 1: Achievable Performance Levels		
Category <sup>1</sup>	Annual Hours of Operation <sup>2</sup>	Preliminary Achievable Performance Levels: New and Modified Engines <sup>3</sup> (g/bhp-hr)
1. Emergency/Standby	< 200	0.2
2. Small Engines (≤ 50 hp)	No limit	0.2 to 0.45
3. Low-usage	≤ 500	0.07
4. High-usage or Special Case	> 500	0.05

B. Technical Basis for the Achievable Performance Levels for New and Modified Stationary Diesel-Fueled Engines

- ◆ This section will provide information on the technical basis for the achievable performance levels for new and modified engines. We are currently collecting information from control system manufacturers and operators of engines with add-on controls in place. A summary of preliminary information is presented below. Although future certification standards are discussed below, achievable performance levels will be based on certification levels that are currently being met.
- ◆ Category 1: Emergency/Standby  
At a level no greater than 0.2 g/bhp-hr. Within the next 3 years, the 0.2 level will be the diesel certification standard for all off-road engines with a hp rating greater than or equal to 100. Our preliminary data search shows that in 1999, several heavy-duty engines within the 200 to 500 hp range were certified at levels below 0.2.
- ◆ Category 2: Small Engines (≤ 50 hp?)  
At a level no greater than 0.45 g/bhp-hr, possibly between 0.2 and 0.45 g/bhp-hr. The 0.45 level is the 2004 diesel certification standard for off-road 25-50 hp engines. We have some data reporting engine certifications in the 0.2 to 0.4 g/bhp-hr range.
- ◆ Category 3: Low-usage (≤ 500 hr/yr.?)  
At a level no greater than 0.07 g/bhp-hr. The urban bus engine (250-300 hp) certification level from 1994 to 1996 was 0.07, based on a

<sup>1</sup> Additional categories or subcategories possible based on type of service, horsepower, hours of operation, or some combination of these factors.

<sup>2</sup> These values may change as performance levels are identified

<sup>3</sup> Preliminary number based on limited certification data and add-on control information. Further information is needed to determine if proposed levels are achievable over entire horsepower range.

transient test. Our preliminary data search shows that in 1999, some heavy-duty engines in the 200 to 500 hp range have been certified at or below 0.07 g/bhp-hr.

- ◆ Category 4: High-usage (>500 hr/yr)  
At a level no greater than 0.05 g/bhp-hr. The current urban bus engine (250-300 hp) certification level is 0.05 g/bhp-hr, based on a transient test. Our preliminary data search shows that in 1999, a few heavy-duty engines within the 200 to 500 hp range were certified at levels below 0.07 g/bhp-hr.
- ◆ Special Cases  
Generally at a level no greater than 0.05 g/bhp-hr. However, achievable performance level may vary on a case-by-case basis.

C. Analysis of Impacts Associated with Meeting Achievable Performance Levels

- ◆ This section will provide information on the risk levels likely to result after the application of the achievable performance levels identified in Section IV.
- ◆ This section will also provide information on other impacts that have been identified for the various control options. Other impacts could include such things as hazardous waste disposal issues, energy impacts, and safety issues.

V. Approval Process

A. Overview

- ◆ All diesel-fueled engines required to obtain a district operating permit would fall into one of two groups of categories, Tier 1 or Tier 2.<sup>4</sup>
- ◆ Engines from Tier 1 categories would be approvable if they meet or exceed the appropriate achievable performance level. *We believe most diesel-fueled engines will be Tier 1 engines.* Likely candidates for Tier 1 include emergency standby engines, small engines, and low-usage engines (categories 1, 2, and 3 from Table 1).
- ◆ Engines from Tier 2 categories would, at a minimum, have to meet or exceed the appropriate achievable performance level for the engine and perform a site-specific screening analysis. Based on the screening analysis, the district would determine if a more detailed analysis and *Findings Report* is necessary. Criteria for determining when a more detailed analysis and *Findings Report* is necessary, could include factors such as:
  - cancer risk from the engine (e.g. cancer risk is greater than 10 in a million or the noncancer total hazard index (THI) greater than 1),
  - availability of cleaner diesel fuel, or
  - availability of electricity or natural gas.

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<sup>4</sup> The district will need some source-specific information to determine which engine category a particular engine falls under. The information would include engine information (e.g., stack height and orientation, exhaust flow rate, horsepower rating, stack exhaust temperature, stack diameter, load factors, typical annual operating hours of the diesel-fueled engine, operating schedule), and receptor information (e.g., map showing residences, school sites, and any sensitive receptors identified by the district which are located within 300 meters of the source).



*Preliminary Draft – Do Not Cite or Quote*

For engines requiring a more detail analysis and Finding Report, we are suggesting public review and comment on the proposed permitting action. The type of information needed for a more detailed analysis is presented in the following section. Likely candidates for engine categories that will fall in Tier 2 include high-usage engines, engine located near schools, non-emergency engines installed where natural gas is available, engines installed at sites designated as “significant risk facilities.” (category 4 from Table 1).

**B. Detailed Analysis**

- ◆ This section only applies to Tier 2 categories of engines and special cases where a more detailed analysis is needed prior making a permit decision.
- ◆ Identify what site-specific information or analysis is needed. Suggested information or analysis could include:
  - An evaluation of the technical and economic feasibility using cleaner diesel fuel or a non-diesel-fueled (i.e. electric or natural gas) engine.
  - A site-specific health risk assessment of the engine.
  - An evaluation of site-specific design considerations that would be employed to minimize the impact of particulate matter emissions on near source receptors. Table 2 presents a list of possible options.

**Table 2: Source Design Options**

Optimizing diesel engine stack height	Maximizing buffer zones via diesel engine location
Operating at times of day that have the least impact	Locating engine to take advantage of meteorology
Non-full load testing	Inspection/maintenance program

- An evaluation of the technical and economic feasibility of emission reduction options that would provide particulate emission reductions beyond the achievable performance level.
- An evaluation of the technical and economic feasibility of emission reduction options that are likely to be available in the next three years that would provide particulate emission reductions beyond the achievable performance level.
- An evaluation of the risk contributed by other proposed or existing diesel-fueled engines at the source.
- An evaluation of the risk contributed by other non diesel-fueled equipment at the source.
- A facility-wide risk assessment.
- A discussion of the uncertainty associated with the emissions, exposure, or risk estimates.
- A discussion of the benefits associated with the proposed project.
- A discussion of any existing federal, state, or local mandates that require the proposed project.

*Preliminary Draft – Do Not Cite or Quote*

- A discussion of facility risk relative to ambient levels
- A discussion of the impacts of the proposed project on media other than air.
- A discussion of the findings of the California Environmental Act document if required.

C. Findings Report

- ◆ Identify suggested contents of report (Information in C above), when needed, who prepares.
- ◆ Discuss when/how to provide opportunity for public comment on Findings Report

D. Public Meeting

- ◆ Discuss when to hold public hearing.

E. Diagram of Approval Process

- ◆ Develop flow diagram of the approval process. Figure 1 is a conceptual flow diagram of the approval process using the preliminary engine categories and preliminary information on what engine may need site-specific review. This diagram is only presented at this point to help the reader understand our proposed approach.

**VI. Diesel-Specific Adjustment to the Existing Risk Assessment Methodology**

- ◆ This section will identify diesel-specific adjustments that can be made in conducting risk assessments of diesel-fueled engines. The adjustments may include: indoor/outdoor correction, wet deposition correction, guidance on using PM10 concentrations, use of area-specific meteorology, corrections for non-vertical stacks, correction for time of day of emissions, correction to pre-1993 emission factor for CARB diesel, use of other dispersion models, use of model results within 100 meter of emission point, addition worker corrects (teacher), accounting for future reduction due to the phase in of existing regulations, and correction for limited duration projects.

**VII. Discussion of the Uncertainty Associated with Risk Assessment**

- ◆ This section will provide a qualitative discussion of the uncertainty associated with risk assessment.

**Figure 1. Conceptual Decision Flow for Permitting New and Modified Diesel-Fueled Engines**

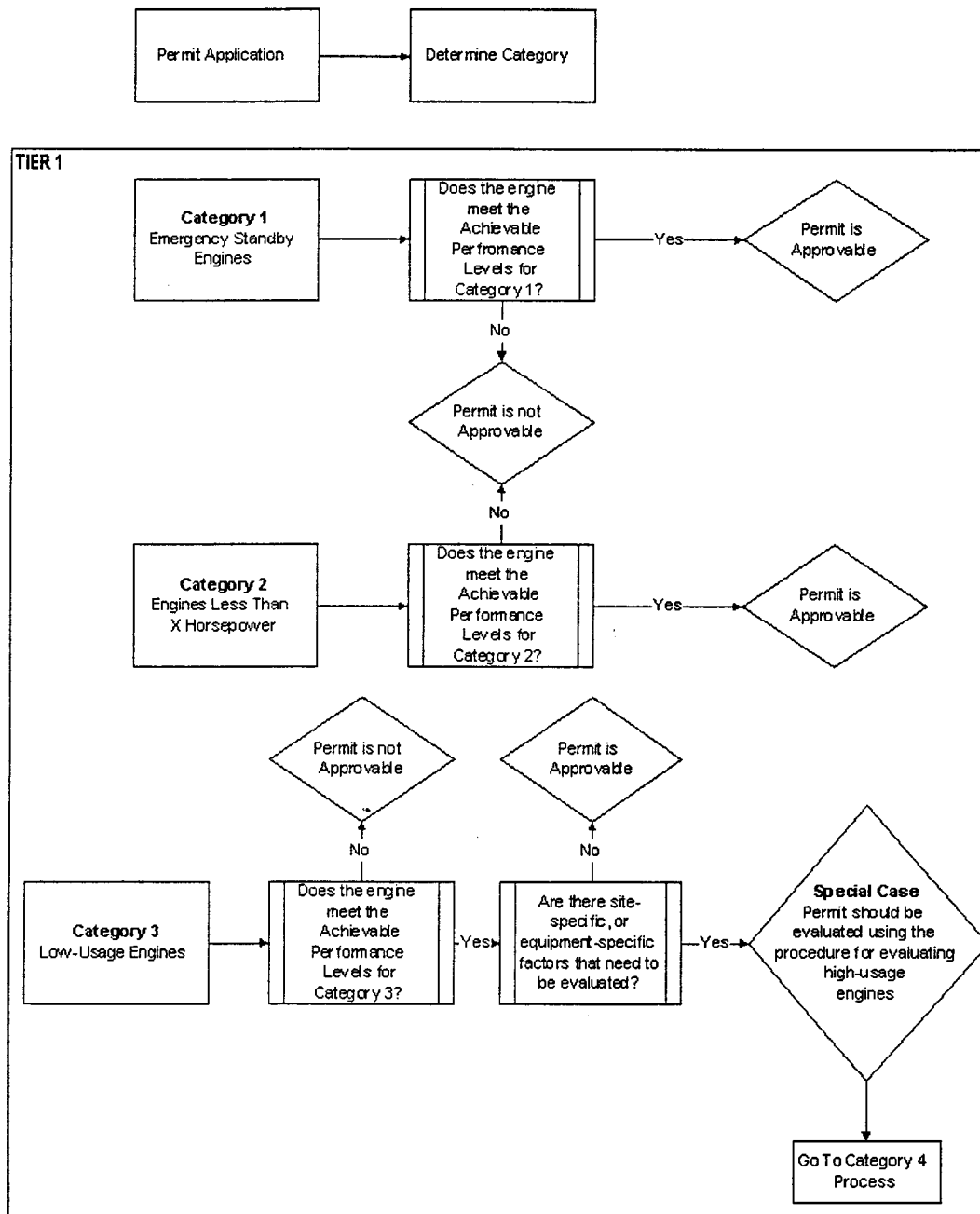


Figure 1. Conceptual Decision Flow for Permitting New and Modified Diesel-Fueled Engines (Con't)

